WHAT IS CLAIMED IS:

1. A confocal scanning microscope comprising:

at least one light source;

a fiber defining a light entrance and a light exit and having a core, wherein the light of the light source is coupled into the fiber via the light entrance, laser transitions being induced in the fiber, light exiting the fiber via a light exit;

an excitation pinhole positioned after the light exit of the fiber laser so as to provide an illuminating light beam adapted for specimen illumination;

a beam deflection apparatus configured to scan the illuminating light beam in two directions that are substantially perpendicular to one another;

a dichroic beam splitter configured to couple the light of the illuminating light beam into an illuminating beam path and direct the illuminating light beam to the beam deflection apparatus so as to form a deflected light beam;

a microscope objective configured to focus the deflected light beam, wherein the dichroic beam splitter, the beam deflection apparatus and the microscope objective are disposed in the illuminating beam path; and

a detector arranged downstream of the dichroic beam splitter and configured to detect fluorescent light collected by the microscope objective.

2. The arrangement as recited in Claim 1 wherein the light exit of the fiber defines a point light source of the confocal scanning microscope.

3. The confocal scanning microscope as recited in Claim 1 wherein the light exit of the fiber is embodied as a resonator mirror with a partially reflective coating.

4. The confocal scanning microscope as recited in Claim 1 wherein the fiber is embodied as an up-conversion fiber laser that comprises a rare earth-doped core.

5. The confocal scanning microscope as recited in Claim 4 wherein the active medium of the fiber laser comprises praseodymium-, erbium-, and/or thulium-doped heavy-metal fluoride glasses.

6. The confocal scanning microscope as recited in Claim 4 wherein the active medium of the fiber laser comprises ZBLAN (53 ZrF_4 - 20 BaF_2 - 4 LaF_3 - 3 AlF_3 - 20 NaF) or ZBYA (50 ZrF_4 - 33 BaF_2 - 10 YF_3 - 7 AlF_3).

7. The confocal scanning microscope as recited in Claim 1 wherein the core of the fiber has a diameter, configured in such a way that the light exiting from the light exit has a rotationally symmetrical beam profile.

8. The confocal scanning microscope as recited in Claim 7 wherein beam profile is a Gaussian profile.

9. The confocal scanning microscope as recited in Claim 7 wherein the beam profile is a TEM_{00}.

10. The confocal scanning microscope as recited in Claim 1 wherein the light exit defines an aperture and wherein the aperture of the fiber laser is adapted to a microscope optical system.

11. The confocal scanning microscope as recited in Claim 1 wherein the light source includes: a diode laser or a semiconductor laser or a solid-state laser or a gas laser and wherein the fiber laser is capable of emitting several wavelengths parallel or simultaneously.

12. The confocal scanning microscope as recited in Claim 1 wherein at least the light entrance or the light exit of the fiber is equipped with a fiber connector and wherein the fiber connector is standardized and is attachable directly to the microscope.

13. The confocal scanning microscope as recited in Claim 1 further comprising a wavelength selection device configured to select light of different wavelengths.

14. The confocal scanning microscope as recited in Claim 13 wherein the wavelength selection device is disposed after the light exit of the fiber laser.

15. The confocal scanning microscope as recited in Claim 13 wherein the wavelength selection device acts in a resonator of the fiber laser.

16. The confocal scanning microscope as recited in Claim 13 wherein the wavelength selection device is configured as a tiltable etalon or as a grating arrangement or as a birefringent plate.

17. The confocal scanning microscope as recited in Claim 13 wherein the wavelength selection device includes an AOTF, AOD, EOD, or AOBS.

18. The confocal scanning microscope as recited in Claim 13 wherein the wavelength selection device includes a color filter.

19. The confocal scanning microscope as recited in Claim 1 further comprising an apparatus for compensating for light output fluctuations of the fiber laser so as to regulate the light coupled into the fiber laser.

20. The confocal scanning microscope as recited in Claim 19 wherein the apparatus for compensating includes an AOTF, AOD, EOD, or an LCD attenuator.

21. The confocal scanning microscope as recited in Claim 1 wherein the fiber laser is a double-core fiber laser.

22. The confocal scanning microscope as recited in Claim 1 wherein emission wavelengths of the fiber laser lie in the visible region.

23. The confocal scanning microscope as recited in Claim 1 further comprising a blocking filter disposed after the light exit of the fiber laser for the light coupled into the fiber laser.